



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: ELECTRONIC PROGRAM GUIDE WITH DIGITAL STORAGE (54) Titre: GUIDE ELECTRONIQUE DE PROGRAMME A STOCKAGE NUMERIQUE			
(57) Abstract An interactive television program guide system with digital storage is provided. The program guide gives users the ability to store information associated with recorded programs in a directory in the digital storage device thereby providing easy access to program information. The program guide may also provide a global media library for indicating the programs stored on removable storage media used with the program guide. The guide may also allow the user to manage and maintain a user media library to do the same. Non-time-sensitive data associated with recorded programs may be stored in a way that allows the user to interact with the data on playback as if the program were being originally aired. The program guide also allows the user to define "super-programs" for playback of a sequence of stored programs or program segments.			
(57) Abrégé L'invention concerne un système guide interactif de programmes télévisés à stockage numérique. Ce guide de programmes permet aux utilisateurs de stocker des informations associées à des programmes enregistrés dans un répertoire du dispositif de stockage numérique, facilitant ainsi l'accès aux informations concernant des programmes. Ce guide de programmes peut également comporter une bibliothèque de supports globale servant à indiquer les programmes stockés sur des supports de stockage amovibles utilisés avec ledit programme. Un utilisateur peut gérer et entretenir une bibliothèque de supports à des fins similaires par le biais de ce guide. L'utilisateur peut stocker des données indépendantes de l'heure associées à des programmes enregistrés de manière à interagir avec les données lors de leur lecture comme si le programme était en direct. A l'aide de ce programme, l'utilisateur peut en outre définir des <u>super programmes</u> destinés à la lecture ultérieure d'une séquence de programmes ou de segments de programmes stockés.			

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(54) Title: ELECTRONIC PROGRAM GUIDE WITH DIGITAL STORAGE		
(57) Abstract		
<p>An interactive television program guide system with digital storage is provided. The program guide gives users the ability to store information associated with recorded programs in a directory in the digital storage device thereby providing easy access to program information. The program guide may also provide a global media library for indicating the programs stored on removable storage media used with the program guide. The guide may also allow the user to manage and maintain a user media library to do the same. Non-time-sensitive data associated with recorded programs may be stored in a way that allows the user to interact with the data on playback as if the program were being originally aired. The program guide also allows the user to define "super-programs" for playback of a sequence of stored programs or program segments.</p>		

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Description

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ELECTRONIC PROGRAM GUIDE WITH
DIGITAL STORAGE

Background of the Invention
This invention relates to video systems, and
more particularly, to interactive television program
guide systems which allow for digital storage of
programs and program related information.

Cable, satellite, and broadcast television
systems provide viewers with a large number of
television channels. Users have traditionally
consulted printed television program schedules to
determine the programs being broadcast at a particular
time. More recently, interactive electronic television
program guides have been developed that allow
television program information to be displayed on a
user's television.

Interactive program guides allow the user to
navigate through television program listings using a
remote control. In a typical program guide display,
television listings are organized into subsets of
listings according to multiple organization criteria
and are sorted in various ways. One approach is to
organize program listings into a program listings grid.
Each row in the grid contains television program
listings for a different channel. The columns in the

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10 grid correspond to a series of scheduled broadcast times. The user can scroll up or down to view program listings for different channels or may pan left or right to view information about programs being 5 broadcast at different times.

15 Recently, interactive program guides have been developed that allow for storage of programs selected within the program guide on an independent storage device, typically a videocassette recorder.

20 10 Usually, a control path involving an infrared transmitter coupled to an infrared receiver in the videocassette recorder is used to control the videocassette recorder. The use of independent analog storage devices like videocassette recorders, however, 25 15 does not allow for the more advanced features that might be implemented if a digital storage device were associated with the program guide.

30 It is therefore an object of the present invention to provide an interactive television program 20 guide with digital storage.

35 Summary of the Invention

40 This and other objects of the invention are accomplished in accordance with the principles of the present invention by providing an interactive program 25 45 guide system with digital storage that allows the program guide to be used to provide more advanced features than previously offered by interactive program guide systems.

45 30 Program guide data is provided by a data source in a satellite uplink facility. This information is transmitted to a television distribution

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facility such as a cable headend via satellite link.

10 The television distribution facility distributes the information (and television programming signals) to user television equipment on which an interactive -

15 5 television program guide is implemented. One suitable distribution scheme involves transmitting television channels and distributing the information for program listings in the vertical blanking interval of one of the channels or a sideband.

20 10 The user television equipment for receiving and processing the television program listings and program data may include a set-top box. The set-top box is also able to receive the television programming distributed by the television distribution facility.

25 15 The program guide implemented on the set-top box processes television program listings information and generates display screens (e.g., an interactive television program guide grid) for display, e.g., on a standard television monitor. The user can interact

30 20 with the television program guide by entering commands via a user input interface. An illustrative input interface is an infrared remote control with cursor keys, a "guide" button, a "record" button, a "play" button, an "exit" button, an "info" button, and an

35 25 "enter", "select", or "OK" button. The set-top box may store television programming and program information in a digital storage device associated with the program guide. The digital storage device may be an optical or a magnetic storage device (e.g., a device using

40 30 writable digital video discs, magnetic disks, or a hard drive or random access memory (RAM), etc.).

The use of a digital storage device

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associated with the program guide provides the user
with more advanced features than could be performed
using an independent analog storage device. For
example, the current invention gives the user the -
10 5 ability to store information associated with recorded
programs in a directory in the digital storage device
thereby providing easy access to program information.
The program guide may also provide a global media
library for indicating the programs stored on removable
15 10 storage media used with the program guide. Non-time-
sensitive data associated with recorded programs may be
stored in a way that allows the user to interact with
the data on playback as if the program were being
20 25 originally aired. The program guide also allows the
user to define "super-programs" for playback of a
sequence of stored programs or program segments. The
program guide may also provide for the transfer of
30 30 programs and super-programs to other volumes of the
digital storage device or to a secondary storage
20 20 device.

Further features of the invention, its nature
35 and various advantages will be more apparent from the
accompanying drawings and the following detailed
description of the preferred embodiments.

25 40 Brief Description of the Drawings
FIG. 1 is a schematic block diagram of a
system in accordance with the present invention.
45 30 FIG. 2 is a schematic block diagram of
illustrative user television equipment in accordance
with the present invention.
FIG. 3 is a generalized schematic block

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diagram of portions of the illustrative television equipment of FIG. 2.

FIGS. 4-14 are illustrative display screens in accordance with the present invention.

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FIGS. 15-22 are flow charts of steps involved in the operation of the present invention.

Detailed Description of the Preferred Embodiments

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An illustrative system 10 in accordance with the present invention is shown in FIG. 1. Main

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facility 12 provides data from program guide data source 14 to television distribution facility 16 via communications link 18. There are preferably numerous

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television distribution facilities 16, although only one such facility is shown in FIG. 1 to avoid over-

complicating the drawing. Link 18 may be a satellite link, a telephone network link, a cable or fiber optic link, a microwave link, a combination of such links, or any other suitable communications path. If it is desired to transmit video signals over link 18 in

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addition to data signals, a relatively high bandwidth link such as a satellite link may generally be preferred to a relatively low bandwidth link such as a telephone line. Television distribution facility 16

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may be any suitable distribution facility (e.g., a cable system headend, a broadcast distribution facility, a satellite television distribution facility, or any other suitable distribution facility.

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The data transmitted by main facility 12 to television distribution facility 16 includes television

30 program listings data (e.g., program times, channels, titles, and descriptions) and other program data for

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10 additional services other than television program
listings (e.g., weather information, associated
Internet web links, computer software, etc.).
15 Television distribution facility 16 -
5 distributes the television program listings and
15 additional data to multiple users via communications
paths 20. Each user has user television equipment 22
for displaying the television program listings
information using an interactive television program
20 guide. Communication paths 20 preferably have
sufficient bandwidth to allow television distribution
facility 16 to distribute television programming to
user television equipment 22. If desired, television
25 programming may be provided over separate
15 communications paths (not shown).

30 An illustrative arrangement for user
television equipment 22 is shown in FIG. 2. Television
30 equipment 22 of FIG. 2 receives video and data from
television distribution facility 16 (FIG. 1) at input
20 26. During normal television viewing, the user tunes
set-top box 28 to a desired television channel. The
35 signal for that television channel is then provided at
video output 30. The outputted signal is typically
either a radio-frequency (RF) signal on a predefined
25 channel (e.g., channel 3 or 4), or a demodulated video
signal, but may also be a digital signal provided to
television 36 on an appropriate digital bus (e.g., a
40 bus using the IEEE 1394 standard, (not shown)). The
video signal at output 30 is received by optional
45 30 secondary storage device 32. Secondary storage device
32 can be any suitable type of analog or digital
program storage device (e.g., a videocassette recorder,

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10 a digital video disc (DVD) player with the ability to record DVD discs, etc.). Program recording and other features may be controlled by set-top box 28 using control path 34. If secondary storage device 32 is a-
15 5 videocassette recorder, for example, a typical control path 34 involves the use of an infrared transmitter coupled to the infrared receiver in the videocassette recorder that normally accepts commands from a remote control such as remote control 40. Remote control 40
20 10 may be used to control set-top box 28, secondary storage device 32, and television 36.

25 The user may also record programs and program data in digital form on digital storage device 31. Digital storage device 31 may be a writable optical
25 15 storage device (such as a DVD player capable of handling recordable DVD discs), a magnetic storage device (such as a disk drive or digital tape), or any other digital storage device. Digital storage device 31 preferably supports a directory structure containing
30 20 information associated with stored entries. This directory information can be stored in one location, for example at the beginning or the end of the storage device. The directory information can also be distributed (e.g., by storing a portion of such
35 25 40 45 30 information at the same location as each entry). For removable storage media like DVDs, each storage unit may have its own directory information, and the program guide may keep a global media library (discussed below).
45 30 Digital storage device 31 can be contained in set-top box 28 or it can be an external device connected to set-top box 28 via an output port and

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appropriate interface. If necessary, processing
10 circuitry in set-top box 28 formats the received video,
audio and data signals into a digital file format.
Preferably, the file format is an open file format such
5 as the Motion Pictures Expert Group (MPEG) MPEG-2
standard. The resulting data is streamed to digital
15 storage device 31 via an appropriate bus (e.g., a bus
using the IEEE 1394 standard), and is stored on digital
storage device 31.
20 Television 36 receives video signals from
secondary storage device 32 via communications path 38.
The video signals on communications path 38 may either
be generated by secondary storage device 32 when
25 playing back a prerecorded storage medium (e.g., a
videocassette or a recordable digital video disc), by
digital storage device 31 when playing back a pre-
recorded digital medium, may be passed through from
30 set-top box 28, may be provided directly to television
36 from set-top box 28 if secondary storage device 32
20 is not included in user television equipment 22, or may
be received directly by television 36. During normal
35 television viewing, the video signals provided to
television 36 correspond to the desired channel to
which the user has tuned with set-top box 28. The
25 video signals provided to television 36 may also be by
set-top box 28 when set-top box 28 is used to play back
40 information stored on digital storage device 31.
When the user wishes to access the features
45 of the program guide, the user may use a "menu" key on
30 remote control 40 or an appropriate key corresponding
to the desired feature. For example, if the user
wishes to view programming information, a "guide" key

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10 on remote control 40 can be used. When set-top box 28 receives commands from remote control 40 that inform set-top box 28 that the menu or other feature button has been pressed, processing circuitry within set-top -

15 5 box 28 supplies information that is displayed on television 36 as described further below.

15 A more generalized embodiment of user television equipment 22 (FIG. 2) is shown in FIG. 3. As shown in FIG. 3, program listings, programming and 20 program data associated with the programming (hereinafter "associated program data") from television distribution facility 16 (FIG. 1) are received by control circuitry 42 of user television equipment 22. Video signals are typically provided on multiple 25 15 television channels. Associated program data and program listings may be provided on a television channel sideband, in the vertical blanking interval of a television channel, using an in-band digital channel, using an out-of-band digital signal, or by any other 30 20 suitable data transmission technique.

35 The user controls the operation of user television equipment 22 with user input interface 46. User input interface 46 may be a pointing device, wireless remote control, keyboard, touch-pad, voice 40 25 recognition system, or any other suitable user input device. To watch television, the user instructs control circuitry 42 to display a desired television channel on monitor 45. To access the features of the program guide, the user instructs the program guide 45 30 implemented on user television equipment 22 to generate a main menu or a desired program guide display screen for display on monitor 45.

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10 The functions of control circuitry 42 may be provided using the set-top box arrangement of FIG. 2. Alternatively, these functions may be integrated into an advanced television receiver, personal computer 5 television (PC/TV), or any other suitable arrangement. 15 If desired, a combination of such arrangements may be used.

20 When a user indicates a desire to access the main menu or other feature of the program guide (e.g., 10 by entering a command with user interface 46), the program guide generates an appropriate program guide display screen for display on monitor 45. An 25 illustrative main-menu screen 50 is shown in FIG. 4. From the main menu, the user can access any one of a 15 number of features of the program guide. Features indicated by main-menu screen 50 may include program 30 listings, recording schedules, the digital storage medium directory, program guide setup, transferring stored entries and super-programs to another volume or 20 device, and global media library. These and other features will be described below.

35 When main-menu screen 50 is displayed on monitor 45, the user may access a feature by indicating a desire to do so. This can be done, for example, by 25 using user interface 46 to position movable highlight 40 region 56 over the desired feature. If user input interface 46 is a remote control such as remote control 45 30 of FIG. 2, the user can position highlight region 56 by, for example, using "up", "down", "left", and "right" cursor keys. The user can then access the desired feature by entering an appropriate command by, for example, using a "select" or "OK" key (hereinafter

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referred to as "selecting" the entry). The main-menu screen may also consist of "buttons" which the user "pushes" by entering appropriate commands with user interface 46 (e.g., by highlighting a button and 5 selecting it). The program guide then generates the appropriate program guide display screen for display on monitor 45.

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When a user indicates a desire to view television programming information (e.g., by selecting 10 program listings option 48 from main-menu screen 50, or by using a "guide" key on remote control 40), the program guide generates an appropriate program listings screen for display on monitor 45. A program listings screen may contain one or more lists of programs 15 organized according to multiple organization criteria (e.g., by program type, theme, or any other pre-defined or user defined and selectable criteria) and sorted in 25 various ways (e.g., alphabetically). The program listings screen may be overlaid over a program being 30 viewed by the user or overlaid over a portion of the program in a "browse" mode.

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One approach is to organize program listings 25 into a program listings grid. An illustrative program listings grid 60 is shown in FIG. 5a. Program listings grid 60 has program listings rows 62, 64, 66, and 68. Program listings row 62 contains selectable program 30 listings for programs 1 and 2 on channel 2 (Public Television). Program listings row 64 contains selectable program listings for programs 1 and 2 on channel 3 (HBO). Program listings row 66 contains selectable program listings for programs 1, 2, and 3 on channel 4 (NBC). Program listings row 68 contains a

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10 selectable program listing for program 1 on channel 5
(FOX). The programs on each channel are typically
different.

15 Program listings grid 60 preferably has —
5 movable cell highlight region 61, which highlights the
current grid cell. The range of movement of highlight
region 61 is typically bounded by column 63 on the
left, by program listings time cells 65 on the top, by
screen boundary 67 on the right, and by lower screen
20 boundary 69 on the bottom.

25 The user may position highlight region 61 by
entering appropriate commands with user interface 46.
For example, if user input interface 46 is a remote
control such as remote control 40 of FIG. 2, the user
30 15 can position highlight region 61 using "up", "down",
"left", and "right" cursor keys. If the user
repeatedly moves highlight region 61 until it reaches
lower screen boundary 69, further attempts at downward
movement cause the program listings to scroll in the
20 vertical direction.

35 Similarly, the listings in grid 60 are moved
when highlight region 61 is panned (i.e., moved to the
right or left). Panning highlight region 61 to the
right causes the program listings in all of the program
25 40 30 45 30 listings rows 62, 64, 66, and 68 to pan to the left by
an equal amount. This allows new program listings to
be displayed. Time cells 65 are adjusted accordingly
(i.e., by incrementing each cell by 30 minutes). If
highlight region 61 is panned to the left, the program
listings in rows 62, 64, 66, and 58 pan to the right.

After a user positions highlight region 61 on
a desired selectable program listing, the user may

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10 access a number of program guide features. For
example, the user may access additional information
(typically text or graphics, but possible video) about
the listing by selecting that listing. The user may -
15 5 obtain this information without exiting grid 60. The
user makes selections by entering appropriate selection
commands with user interface 46 (FIG. 3). If user
interface 46 is a remote control such as remote control
40 of FIG. 2, the user may use a "select", "OK", or
20 10 "info" key to make a selection.

25 Making a selection directs the program guide
to generate a program listing information screen for
display on monitor 45. An illustrative program listing
information screen 70 is shown in FIG. 6. Information
30 15 displayed in information screen 70 may include any
information associated with the listing supplied by
main facility 12. The information may include, for
example, the title of the selection, a description,
episode information, the channel, cast members,
35 20 parental control ratings, categories, available
language(s), available video formats, or other
information like associated Internet web sites or
computer software.

40 25 The user can exit program listing information
screen 70 by indicating a desire to exit the screen by,
for example, entering appropriate commands with user
interface 46 (FIG. 3). If user interface 46 is a
45 30 remote control such as remote control 40 of FIG. 2, the
user may for example, use an "exit" or "last" key to
exit the screen. The program guide may respond to a
"last" command by generating the previous program guide
display screen for display on monitor 45. The program

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10 guide may respond to an "exit" command by returning the user to normal television viewing.

40 Just like program listings grid 60 of FIG.

45 25 5a, program listings grid 141 of FIG. 5b may contain highlight region 149 to select listings in any of the rows, including row 145, and thereby access program listings information screen 70 (FIG. 6) for a selected listing. If the user selects a program stored on

30 30 digital storage device 49 (i.e., a listing in row 145), the program guide responds by obtaining the information associated with the listing for display in program

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10 device 49, and by displaying program listings information screen 70. The information for program listings information screen 70 may be stored as a 5 directory entry on digital storage device 49.

15 associated with the program stored on digital storage
device 49 may be presented to the viewer by the program
guide just as it was presented when the program was
originally aired. This will be described more fully
below. The program guide may also provide features
20 during playback which are similar to those provided for
by current analog storage technologies (e.g., "fast-
forward", "rewind", "pause", and "stop").

The user may select a program and associated

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10 program data for recording on digital storage device 49 without leaving grid 60 or grid 141. The user makes selections for digital recording by entering appropriate selection commands with user interface 46—
15 5 (FIG. 3). If user interface 46 is a remote control such as remote control 40 of FIG. 2, the user may use a digital "record" key to select the program whose listing is surrounded by highlight region 61 for digital recording. If desired, the default recording
20 10 techniques used by the program guide may be digital recording.

25 Making a selection for digital recording causes the program guide to gather information from the currently loaded digital storage medium. Such
30 15 information may include the estimated amount of time remaining on the storage medium (if, for example, the digital storage medium is a partially full disk). The program guide may also check directory information on the digital storage medium and compare it to the
35 20 selected program listing to determine if the selected program has already been recorded. If the program guide determines that the selection has already been recorded, re-recording is not necessary. The program guide may retain the information associated with the
40 25 selected program listing (supplied by main facility 12 of FIG. 1) for access by the user (e.g., using the recording schedule screen described below).

45 In response to an indication by the user to digitally record a selection, the programming guide may
30 30 generate a recording schedule screen for display on monitor 45. The recording schedule screen lists the programs currently scheduled for recording on digital

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storage device 49. An illustrative recording schedule screen 80 is shown in FIG. 7a. Recording schedule screen 80 contains a number of pieces of information which may include, for example, the volume name of the 5 currently loaded medium, an estimate of the amount of time remaining on the medium, and a grid 81 or other suitable list or table listing the programs currently scheduled for recording and relevant recording information. Grid 81 may include the title of the 10 selections, the channel for recording, the recording date and time, and the duration of the selection.

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The user can access the associated program data supplied by main facility 12 of FIG. 1 of the 25 programs scheduled to be recorded by indicating a 15 desire to do so (e.g., by positioning highlight region 82 on a desired program listing and pressing an "OK" key). In response to such an indication, the program guide generates a selected program listing information screen for display on monitor 45. An illustrative 20 selected program listing information screen 84 is shown in FIG. 7b. A selected program listing information screen is similar to a program listing information screen (see FIG. 6), but may also contain user fields 30 that the user may edit to add information that the user 25 desires to associate with the program. FIG. 7b shows illustrative user description field 85, user category field 86, and user other field 88. The user may edit the contents of these user fields by, for example, 35 using user interface 46 to position highlight region 89 over the desired field and indicating the information 40 that the user desires to associate with the program. If user interface 46 is a remote control such as remote 45

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10 control 40 of FIG. 2, alphanumeric keys on remote control 40 may be used, or the user may scroll through the alphabet using "up" and "down" keys to select individual letters and thereby form words in the user-
5 fields.

15 10 If all of the information does not fit on a single screen, the user can scroll downward (and upward) to view the non-displayed information by indicating a desire to do so by, for example, using "up"
20 15 and "down" keys on remote control 40.. The program guide responds to such an indication by scrolling the screen accordingly and showing the non-displayed information.

25 20 Recording schedule screen 80 of FIG. 7a may also indicate which of the selections currently scheduled for recording will fit on the currently loaded storage medium (e.g., when a DVD is loaded in a
30 35 DVD player). This may be done, for example, by using bold text or text of a different color (see, e.g., M*A*S*H and TERMINATOR listings 89). Selections that cannot fit may be indicated as such by a different indicator, like dotted line 83. Either or both indicators can be used and the types shown in FIG. 7a are for illustration purposes only.

40 45 25 The user can exit recording schedule screen 80 by indicating a desire to do so (e.g., by entering appropriate commands with user interface 46 of FIG. 3). If user interface 46 is a remote control such as remote control 40 of FIG. 2, the user may use, for example, an 30 "exit" key to exit the screen. When the command is given, the program guide may respond by generating the previous screen for display on monitor 45.

25 The user may also select programs and
associated program data for digital recording when not
15 in program listings grid 60 by indicating a desire to
do so during normal television operation (e.g., by
entering appropriate commands with user interface 46 of
30 FIG. 3). If user interface 46 is a remote control such
as remote control 40, this can be done by using a
20 "record" key during television viewing. The program
guide responds by generating a recording screen for
display on monitor 45. An illustrative recording
screen 87 is shown in FIG. 8. Recording schedule
screen 87 may display information of the program
35 currently being viewed by the user, such as the current
channel, begin time, and end time for recording. The
program guide may provide the user with the opportunity
to edit the displayed information (e.g., the start and
end time) by issuing appropriate commands with user
40 interface 46. When finished, the program guide may
30 return the user to normal television viewing and begin
recording the selection, the program guide may generate

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10 a recording schedule screen for display on monitor 45
so that the viewer may see the recording schedule.

15 Before recording a new program and associated
program data, the program guide may automatically cause
5 digital storage device 49 to search for available
space, and may store the program and associated program
data anywhere on digital storage device 49 (e.g.,
between two other programs). The program and
associated program data may even be stored in non-
20 contiguous space on the storage medium. A best-fit
algorithm may be used to determine where to store the
program based on available free space and the length
and format of the program.

25 The program guide may also store associated
15 program data in a directory entry of digital storage
device 49. This data can include, for example, the
date and time the program was recorded, the channel the
30 program was recorded on, the time duration of the
program, the program title and description, cast
20 members, parental control ratings, program categories,
episode information, recorded languages and video
35 formats, Internet links, graphics, or any other
information supplied by main facility 12 of FIG. 1, the
user, or the programmer.

40 25 Along with the program and associated program
data, the program guide may also store additional
components of a program on digital storage device 49.
This can include additional video formats, additional
languages, additional subtitles, or other data that
45 30 cannot be stored in a directory entry. The program
guide will either store all of the supplied video
formats and languages, or store only the variant that

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10 matches the current viewer profile preferences
(described below).

15 Unless associated program data is time
sensitive, the user may interact with the data stream-
5 during playback just as when the program was originally
aired. If, for example, associated program data is
computer software that the user could have accessed
when the program was originally aired, the software may
be stored on digital storage device 49, so that the
20 user can access the software during playback. Such
software may be, for example, shopping software that
allows the user to place orders for purchasing goods
offered in the program. Or, a program may have
25 associated with it an Internet link that the user can
15 select and access an Internet site.

30 The program guide may also allow a user to
view the directory information of the currently loaded
storage medium. The user can access this feature by
35 indicating a desire to do so by, for example, issuing
20 the appropriate commands with user interface 46. If
user interface 46 is a remote control like remote
control 40 of FIG. 2, this may be done by using a
"directory" or "list" key. This can also be done by
accessing the main menu 50 (FIG. 4) and positioning
25 highlight region 56 over medium directory option 53 and
40 selecting medium directory option 53.

45 When the user indicates a desire to view the
directory information for the currently loaded storage
medium, the program guide obtains directory information
30 from digital storage device 49 and generates a
directory listing screen for display on monitor 45. An
illustrative directory listing screen 90 is shown in
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10 FIG. 9. Directory listing screen 90 may indicate, for example, the volume name and available time left on the currently loaded storage medium. Directory listing screen 90 may also include directory listing grid 91.-

15 5 Directory listing grid 91 contains information about entries stored on digital storage device 49. This information may include any of the directory information stored on the medium and may be presented according to the current viewer preferences
20 10 (described below). It may include, for example, the title, channel, record date, record time and duration of the entries. It may also include an indication of whether the entries have been viewed. Because the directory information for directory listing screen 90
25 15 is stored digitally, it may generally be accessed rapidly (e.g., in a fraction of a second). This fast access capability makes the directory feature easy to use to quickly check the status of stored entries.
30 20 This would not be possible if an analog storage device such as a standard videocassette recorder were used.

35 25 The program guide may allow the user to access a full view of all of the directory information stored for an entry. The user may access this feature while in directory listing screen 90 by indicating a desire to do so by, for example, entering appropriate commands with user interface 46. If user interface 46
40 30 is a remote control such as remote control 40 of FIG. 2, this can be done by positioning highlight region 95 over the desired entry using "up" and "down" keys, and then selecting the entry, or by selecting an on-screen "info" option.

45 35 Once the user indicates a desire to view the
50 40

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full directory entry information of an entry, the program guide generates a full entry information screen for display on monitor 45. An illustrative full entry information screen 100 is shown in FIG. 10. If the - 5 full directory information does not fit on one screen, the user can scroll downward (and upward) by indicating a desire to do so by, for example, using "up" and "down" keys on remote control 40. In addition, user-defined fields may be edited by positioning highlight 10 region 101 over any user-defined field and entering information into the highlighted field (e.g., with alphanumeric keys on remote control 40).

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To exit full entry information screen 100, the user indicates a desire to do so by, for example, 25 using an "exit" key on remote control 40. The program guide responds by saving the directory information to digital storage device 49 if the information has 30 changed and generating the previous screen for display on monitor 45.

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20 The program guide allows a user to play back a stored entry when the user indicates a desire to do so by entering appropriate commands with user interface 46. This can be done, for example, by selecting an entry from directory listing grid 91 and using a "play" 25 button on remote control 40, or by selecting an on-screen "play" option from a list of on-screen options generated by the program guide in response to the selection of an entry by the user. Any non-time sensitive data associated with the program may be 30 presented to the viewer by the program guide just as it was presented when the program was originally aired.

The program guide may also edit a program and

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its associated data when the user indicates a desire to
10 do so. This can be done, for example, by entering appropriate commands with user interface 46. If user interface 46 is a remote control such as remote control
5 40 of FIG. 2, then this can be done by using "delete" keys in a particular way (such as by using the "delete" key twice), or by using a "partial" key, when the user
15 is in directory listing screen 90. This may also be accomplished by selecting an on-screen "edit" option
20 provided by the program guide in response to the selection of a program listing or directory entry.

Once the user indicates a desire to edit a program, the program guide generates an edit screen for display on monitor 45. An illustrative edit screen 110
25 15 is shown in FIGS. 11a, 11b, and 11c. Screen 110 indicates the entry to be edited and other relevant information. This information may include, for
30 example, the title, channel, record date, record time, and duration of the entry. Screen 110 may also contain
20 edit indicator 115 for indicating the portion of the entry for deletion. Indicator 115 may have start time
116, end time 117, markers 118 and 140, and highlight
35 region 119. Screen 110 may also have video feedback area 113 for showing the user the portion of the
25 program corresponding to the position of markers 118 and 140.

Highlight region 119 is initially positioned by the program guide so as to surround one of the markers, for example marker 118. The user may indicate
45 30 a desired starting time for deleting by positioning marker 118 (FIG. 11b). This may be done, for example, by entering appropriate commands with user interface

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46. If user interface 46 is a remote control such as
10 remote control 40 of FIG. 2, this can be done by using
"left" and "right" buttons of remote control 40 to
slide marker 118 left and right. As the position of
5 marker 118 is changed, its current time position
15 ("marker time") 120 is displayed as shown in FIGS. 11b
and 11c. The beginning portion of a program is edited
by leaving marker 118 in its initial position.

When the desired start time position is
20 indicated by marker 118, the user can select marker 140
to define the end of the program segment by, for
example, using the "OK" key of remote control 40. The
program guide responds by positioning highlight region
25 119 around marker 140. The user may indicate the end
15 time of the portion of the program to be deleted by,
for example, positioning marker 140 in the same way
that marker 118 was positioned, as shown in FIG. 11c.

30 Video feedback area 113 may display the
portion of the program corresponding to markers 118 and
20 140 as the markers are positioned by the user. The
program guide may also provide the user with the
35 opportunity to view the portion of the program selected
for deletion in a "fast-forward" playback mode, once
the program portion is selected.

25 After the user is finished, the program guide
40 may allow the user to continue to edit additional
segments. The program guide may also return the user
to a previous screen (e.g., directory listing screen
45 90) or to normal television viewing, when the user
30 indicates a desire to do so (e.g., using a "last" or
"exit" key on remote control 40). The program guide
may also provide the user with the opportunity to

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confirm that the portion selected for deletion is properly defined.

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Once the program portion or portions are defined, the program guide issues appropriate commands-
5 to digital storage device 49 to delete the selected program segment, additional components, and associated data as appropriate. For example, the program guide may immediately display directory listing screen 90 and issue appropriate commands to digital storage device 49
10 to delete the selected portion and update the directory information associated with that portion, if appropriate.

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The program guide may also allow the user to define "super-programs". Super-programs are sequences
15 of programs or program segments that the guide will play back sequentially in a specified order. The user may indicate the desire to access the super-program feature by, for example, entering appropriate commands with user interface 46. If user interface 46 is a
30 20 remote control such as remote control 40 of FIG. 2, the user may use a "super-program" key on remote control 40 after positioning a highlight region such as highlight region 95 of directory listing screen 90 (FIG. 9) over a desired program listing (e.g., M*A*S*H*), or by
35 25 selecting an on-screen "super-program" option from a list of on-screen options which are provided by the program guide when a program is selected.

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The program guide may also provide the user with the ability to name super-programs and to store
45 30 them on digital storage device 49. Entries for the named super-programs may be kept in the directory maintained on digital storage device 49, and may be

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10 displayed in screens which list directory entries (e.g.,
directory listing screen 90), along with the directory
entries for program listings. For example, when
directory listing screen 90 is displayed by the program
5 guide, the program guide may provide the user with the
opportunity to select a named super-program.

15
20 In response to the user selection of a named
super-program, the program guide may generate a super-
program screen for display on monitor 45. The program
guide may also provide the user with an on-screen list
of options for performing super-program functions
(e.g., playing, transferring or editing the super-
program).

25 When the user indicates a desire to define a
15 super-program, the program guide generates a super-
program screen for display on monitor 45. An
illustrative super-program screen 130 is shown in FIGS.
30 12a and 12b.

35 Super-program screen 130 is organized into
20 three areas. Area 131 indicates the selections stored
on digital storage device 49 (or the currently loaded
digital storage medium of digital storage device 49).
Area 132 indicates the super-program sequence. Video
feedback area 137 displays the portion of the program
25 included in the super-program. Super-program screen
40 130 may also indicate the volume name of and time
remaining on the currently loaded storage medium.

45 The three areas of super-program screen 130
may also be presented only when needed. For example,
30 area 131 may be displayed only when the program guide
is providing the user with the opportunity to select a
program stored on digital storage device 49. Once the

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10 user has selected a program, area 131 may be removed
and area 132 may replace it while the program guide is
providing the user with the opportunity to define a
program segment for inclusion in the super-program. -

15 5 Video feedback area 137 may be displayed only in
response to an indication by the user to the program
guide to display the program segment. Thus, it may not
be necessary for all three areas to be displayed at
once.

20 10 To define a super-program, the user indicates
which program is to be included in the super-program
sequence. The program guide may also give the user the
ability to include in the current super-program other
25 previously defined super-programs. Area 131 includes a
15 directory listing grid 133 for listing the programs and
super-programs stored on digital storage device 49. If
the user interface is a remote control such as remote
30 control 40 of FIG. 2, the user may use "up" and "down"
keys to position highlight region 134 on top of the
20 desired program or super-program. The user may then
select a program or super-program by using a "select"
35 or "OK" key on remote control 40. The user may also
access other information associated with the entry by
using an "info" key on remote control 40, or by
25 selecting a suitable option from an on-screen options
40 list provided by the super-program. The program guide
generates a full entry information screen containing
information associated with the selected program when
the "info" key is pressed.

45 30 Whenever the user selects a program, the
program guide places the selected entry in the super-
program sequence at a defined point in the sequence

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(e.g., at the end of the sequence). As shown in FIG. 12a, for example, a first segment entry has been selected by the user and the user is currently selecting the second segment entry. The segment 5 entries are listed in second area 132. The user then has the option of defining the play segment of the program to be played. Indicators 135 indicate the currently defined play segment.

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If the user wishes to define a play segment, the user may do so, for example, by using markers 136 to define the segment in the same manner described for editing programs. As shown in FIG. 12b, the user uses highlight region 134 (positioned by the program guide over one of the markers) to move the markers 136 to 15 define the play segment. Video feedback area 137 displays the portion of the program corresponding to markers 136 as markers 136 are individually positioned. The user may indicate he or she is finished defining the play segment by, for example, using an "OK" key on 20 remote control 40. The program guide then responds to this indication by positioning highlight region 134 (FIG. 12a) in first area 131 to allow the user to 30 define another entry in the super-program sequence.

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The user may indicate that he or she is 25 finished defining the super-program by issuing appropriate commands with user interface 46. If user interface 46 is a remote control such as remote control 40 of FIG. 2, the user may use a "play" key to finish editing the super-program and play the super-program. 30 The user may also select an on-screen "play" option from a list of on-screen options provided by the program guide.

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25 The user may also store the super-program for
15 playback or editing at a later time. The user may
indicate a desire to postpone playback by, for example,
issuing appropriate commands with user interface 46.
30 If user interface 46 is a remote control such as remote
control 40 of FIG. 2, the user may use an "exit" key on
20 remote control 40 or select an on-screen "exit" option.
Control circuitry 42 responds to an indication to
35 postpone playback by storing the playback sequence
(either in memory or on the digital storage device).
The user may later access the super-program by, for
40 example, selecting the super-program while in directory
listing screen 90. The program guide may respond by
providing an on-screen list of options (e.g., edit,
play back, transfer) that the user may select from.
45 The program guide may also respond by generating a
30 super-program screen with the previously entered
selections and defined play-segments, providing the
user with the opportunity to add, edit or re-order the

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programs and program segments.

10 The program guide may also allow the user to transfer programs and super-programs stored on digital storage device 49 to other volumes of digital storage_ 5 device 49 or to secondary storage device 47 (FIG. 3.). Secondary storage device 47 may be another storage 15 device available in the home network system like a videocassette recorder, a recordable digital video disc device, a computer (with an appropriate storage 20 device), or other digital storage device. This feature may be accessed by, for example, issuing appropriate commands with user interface 46. If user interface 46 is a remote control such as remote control 40 of FIG. 25, the user may use a "record" or "transfer" key when 15 in the super-program screen, or, for example, the user may select a "transfer" option from an on-screen list of options provided by the program guide in response to 30 the user selecting a super-program from directory listing screen 90.

20 The program guide responds to this indication by issuing appropriate instructions to digital storage 35 device 49 to read the selected programs and associated data or the programs and associated data of the selected super-program sequence. The program guide 25 then transfers the programs and associated data (if possible) in an appropriate format to secondary program data storage device 47. If, for example, secondary 40 storage device 47 is a videocassette recorder, the program guide directs user television equipment 22 to 45 30 convert the digitally stored program or super-program into an appropriate analog format.

Transferring the data (e.g., software)

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10 associated with a program or super-program may not be possible with some analog secondary storage devices, so the program guide may accordingly ignore the associated data during transfer. The program guide may, however,
15 5 provide for the labeling of analog storage media with associated data. Program guides that provide for labeling videocassettes with program information are described, for example, in Blackwell U.S. patent application Serial No. 08/924,813, which is hereby
20 10 incorporated by reference herein in its entirety.

25 The programs and data may also be transferred directly from digital storage device 49 to secondary storage device 47 via channel 43 if desired. The program guide may also transfer the programs and data
30 15 to another volume of digital storage device 49.

35 If digital storage device 49 is a device that uses removable recording media (e.g., floppy disks or recordable optical discs) the program guide may also allow a user to view a global media library screen
40 20 which indicates directory information of removable storage media used with the program guide. The user may access this feature by indicating a desire to do so by, for example entering appropriate commands with user interface 46. If user interface 46 is a remote control
45 25 such as remote control 40 of FIG. 2, this may be done by, for example, using a "library" key. This may also be done by accessing main menu 50 (FIG. 4) and positioning highlight region 56 over global media library option 57 and selecting media library option
50 30 57.

55 The global media library may be maintained automatically by the program guide. For example, the

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10 program guide may store or update directory entry
information according to the current viewer preferences
(described below) in a central storage area (e.g.,
random access memory (RAM) or a central hard disk —
5 drive) each time directory information is stored or
15 updated on a removable storage medium. The program
guide may also store unique identifiers identifying the
removable storage medium on which programs are stored
(e.g., volume names or media numbers).
20 10 An illustrative global media library screen
250 is shown in FIG. 13. Global media library screen
250 may display program listings in any list, table,
grid or other suitable form that contains information
25 about stored entries on removable storage media used in
15 digital storage device 49. Listings may be grouped
into subsets of listings according to multiple
organization criteria and sorted in various ways.
30 Another approach is to display the listings in a
library listing grid, such as library listing grid 251.
20 Library listing grid 251 may include a row for each
removable storage medium used with digital storage
35 device 49 (e.g., rows 261, 262, 263, 264, and 265), and
columns for each program stored on each removable
storage medium (e.g., columns 271, 272, and 273). A
25 user may access additional storage media and additional
40 programs not displayed by, for example, scrolling up
and down or panning left and right.
Just like directory listing screen 90 of FIG.
45 9, global media library screen 250 of FIG. 13 allows
30 the user to access features of the program guide
already described (e.g., by positioning highlight
region 257 around a listing and selecting the listing),

10 which may include accessing a full entry information
screen, playing back, deleting and partially deleting
programs, and defining super-programs containing
programs from different storage media. These features
15 5 may also be accessed by the user by selecting the
desired feature from a list of on-screen options
provided by the program guide in response to the
selection of a listing by the user.

20 If the user indicates a desire to access a
10 feature of the program guide which operates on a medium
that is not currently loaded in digital storage device
49, the program guide may automatically change the
loaded storage medium if digital storage device 49 has
25 the ability to do so. Digital storage device 49 may
15 be, for example, an optical jukebox with multiple
recordable optical discs. If the user selects a
program on a disc not currently positioned before a
30 read/write head of the jukebox, the jukebox re-arranges
the discs until the disc with the selected program is
20 positioned for reading or writing. If the disc with
the selected program is not in the jukebox, the program
35 guide may display indication 255 to the user that the
disc must be loaded. The program guide may also
display such an indication if, for example, digital
25 storage device 49 is a floppy disk drive and the disk
40 with the selected program is not in the drive.
Indication 255 may include a unique identifier
identifying the unloaded storage medium. Preferably,
45 the unique identifier is not displayed for the user
30 unless the required removable storage medium is not
loaded.

50 If digital storage device 49 uses removable

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storage media (e.g., floppy disks or recordable optical disks), the program guide may provide the user with the opportunity to enter an identifier that identifies the removable storage medium on which the program is stored. The identifier may be a volume name, a medium number, or other suitable unique indicator.

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The program guide may also allow the user to choose various selectable options and select the types of information for display in various screens. The user can access this feature by indicating a desire to do so by, for example, using user interface 46 to enter appropriate commands. If user interface 46 is a remote control such as remote control 40 of FIG. 2, the user can indicate a desire to access this feature by selecting set-up option 54 from the main menu screen of FIG. 4, or by using a "set-up" key on remote control 40.

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When the user indicates a desire to access the set-up feature of the program guide, control circuitry 42 generates a set-up screen for display on monitor 45. The set-up feature allows a user to select options and set user preferences. An illustrative set-up screen 120 is shown in FIG. 14. Set-up screen 120 can be organized into parts. For example, one part may be used to handle entry information display options, another may be used to handle storage options, and another may be used to handle playback options.

Entry information area 121 is an example of how set-up screen 120 may be used to display selectable components that the user may select for display in screens that display program information (e.g., program listings grid 50, recording schedule screen 80, and

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directory listing screen 90). Unselected directory components cannot be viewed from such screens, and can only be viewed in full information view (e.g., program listing entry information screen 70 and full entry - 5 information screen 100).

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Storage option area 122 allows the user to select options relating to storage. For example, the user can select the language tracks or video formats for storing with a program. The user can also set

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10 whether a parental control feature applies to the recording of programs which do not meet certain parental control criteria. The user may also choose whether the program guide automatically erases entries

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15 viewed. When erased, an entry's directory information and additional components are also removed from digital storage device 49.

30

Playback option area 133 allows the user to select options related to playback. One selectable 20 feature, for example, is a skip commercial feature. If active, the program guide attempts to distinguish program material from advertisements based on data recorded with the programming or other suitable cues. Any material identified as advertising is automatically 25 skipped during playback. The user may also set default languages and video formats for playback.

40

Steps involved in operating the program guide of the present invention are set forth in FIGS. 15-20.

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FIG. 15 illustrates an overview of steps involved in 30 accessing a number of features of the program guide. The steps illustrated by FIGS. 15-20 are illustrative and may be performed in any order.

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At step 400 of FIG. 15, the programs and
10 associated program data are stored on digital storage
device 49 using the program guide. At step 402,
additional components are digitally stored. At step -
5 404, the programs and associated program data are
15 displayed on monitor 45 (FIG. 3) using the program
guide. The programs and associated program data may be
displayed on monitor 45 so as to provide the user with
access to the programs and associated program data as
20 if the programs and associated program data were being
originally aired, as set forth in step 406.

At steps 408, 410, 412, and 414 the program
25 guide displays on monitor 45 a set-up screen (such as
set-up screen 120 of FIG. 14), a recording schedule
15 screen (such as recording schedule screen 80 of FIG.
7a), a program listings screen (such as a screen
30 containing program listings grid 60 of FIGS. 5a and
5b), and an edit screen (such as edit screen 110 of
FIGS. 11a, 11b, and 11c). At step 416, the program
20 guide transfers the programs and associated program
data (if possible) to another volume of digital storage
35 device 49 or to secondary storage device 47 (FIG. 3).

FIG. 16 illustrates steps involved providing
the user with the ability to define selectable options.
40 At step 424, the program guide provides the user with
the opportunity to define storage options. If
language, video format, enforcement of parental
control, and auto-erase storage options are provided
45 (FIG. 15), the program guide stores the programs and
30 associated program data on digital storage device 49
according to how the storage options are defined as set
forth in steps 426, 428, 430, and 432 respectively.

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20 FIG. 17 illustrates steps involved in
10 providing a user with the opportunity to record
programs and associated program data on digital storage
device 49. At step 410, the program guide displays a
recording schedule screen, such as recording schedule
screen 80 of FIG. 7a, on monitor 45. At step 450, the
25
15 program guide indicates on monitor 45 the programs
currently scheduled for storage on digital storage
device 49. At step 452, the program guide provides the
30 user with the opportunity to select one of the
indicated programs.

35 20 The program guide may also display a selected
program listing information screen, such as selected
program listing information screen 84 of FIG. 7b, for a
selected program on monitor 45 as set forth in step
454. The program guide displays one or more fields of
40 25 associated program data in step 456, and may also
display one or more user fields in step 458. At step
460, the program guide provides a user with the
opportunity to enter information into user fields 460.
At step 462, the program, associated data and
45 30 additional components are stored on digital storage
device 49.

The program guide may also provide the user

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10 with the opportunity to record programs during
television viewing at step 464. At step 466, the
program guide generates a recording screen for display
on monitor 45. At step 468, the program guide provides
5 the user with the opportunity to edit recording
information, such as begin and end time. At step 470,
the program guide provides the user with the
opportunity to access the recording schedule screen.
The program guide displays the recording schedule
15 screen (step 410) or begins recording programs,
associated data, and components (step 462) depending on
the indication from the user.

20 FIG. 18 illustrates steps involved in
displaying program listings and program listing
25 information on monitor 45. The program guide may
display a program listings screen on monitor 45 at step
15 412. The program guide may include in the program
listings screen a program listings grid (sub-step 470).
30 At step 472, the program guide provides the user with
20 the opportunity to define and select organization
criteria (e.g., theme, program type, etc.) and chose a
35 sorting method (e.g., alphabetically) for organizing
and sorting the listings. At step 474, the program
guide provides the user with the opportunity to select
25 a program listing. The program guide may also display
40 on monitor 45 a program listings information screen,
such as program listings information screen 70 of FIG.
6, indicating associated program listing information.

45 At step 478, the program guide may provide a
30 list of on-screen options that the user can select to
access program guide features. For example, there may
be on-screen "record" and "super-program" options. If

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super-programs and stored entries are included in the program listings screen, the program guide may also provide on-screen "transfer" and "playback" options. The program guide displays programs, associated data,-- 5 and additional components at step 480. This may be program, data, and components of the selected listing. At step 480 the program guide may also return the user to the program being viewed before the program listings screen was accessed. Step 480 may also correspond to 15 where the user watches television programming before having accessed the program listings screen.

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Other steps involved in accessing programs and associated data stored on digital storage device 49 are set forth in FIG. 19. The program guide stores 15 programs and associated program data on digital storage device 49 at step 406. At step 488, the program guide maintains a directory of the stored associated program data. At step 490, the program guide displays a directory listing screen, such as directory listing 20 screen 90 of FIG. 9, on monitor 45. The program guide indicates directory entry information at step 492 (by, for example, displaying directory listing grid 92 of FIG. 9 on monitor 45), and provides a user with the opportunity to select directory entry information at 25 step 494. At step 495, the program guide provides the user with an on-screen list of options (e.g., "playback", "transfer", "super-program", etc.).

Steps involved in displaying additional information for a selected entry are set forth in steps 30 496, 498, 500, and 502. At step 496 the program guide displays a full entry information screen, such as full entry information screen 100 of FIG. 10, on monitor 45.

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At step 498, the program guide displays fields of
10 directory entry information on monitor 45, and at step
500 the program guide displays user-defined fields on
monitor 45. At step 502, the program guide provides
5 the user with the opportunity to enter user information
15 in the user-defined fields.

Steps involved in editing programs and
associated program data associated with directory entry
information are set forth in steps 504, 506, 508, and
20 510 of FIG. 20. The program guide displays an edit
screen, such as edit screen 110 of FIGS. 11a, 11b, and
11c, on monitor 45. At step 506, the program guide
provides a user with the opportunity to define the
25 portions of stored programs and associated program data
15 to be edited by the program guide. At step 508 the
program guide displays a video feedback area on monitor
45. The program guide edits the portions of stored
30 programs and associated data from digital storage
device 45 at step 510.

20 Steps involved in providing the global media
library feature of the present invention are set forth
35 in FIG. 21. At step 522, the program guide stores
programs and associated program data on removable
digital storage media in digital storage device 49. At
40 25 step 524, the program guide maintains a global media
library of the stored associated program data. The
program guide displays a global media library screen,
45 such as global media library screen 250 of FIG. 13, on
30 monitor 45 at step 526. At step 528 the program guide
provides a user with the opportunity to select a
program indicated by the global media library screen.
If the digital storage medium containing the selected
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10 program is not loaded in digital storage device 49, the
program guide displays on monitor 45 an indication that
the storage medium is not loaded at step 530.

15 Steps involved in providing the super-program
5 feature of the present invention are set forth in FIG.
22. The program guide stores programs and associated
program data on digital storage device 45 at step 532.
At step 534, the super-program sequence is defined.
This may be done by displaying a super-program screen,
20 such as super-program screen 130 of FIGS. 12a and 12b,
on monitor 45 as set forth in step 536. Stored
programs are indicated by the program guide on monitor
45 at step 538, and the program guide provides a user
with the opportunity to select the indicated programs
25 at step 540. The program guide displays the programs
and associated program data which are part of the
super-program sequence on monitor 45 according to the
super-program sequence at step 550.

30 Further steps involved in providing the
20 super-program feature are set forth in steps 524, 544,
546, and 548. At step 542, the program guide provides
35 the user with the opportunity to define play segments.
The program guide may display a play segment indicator
and marker for defining the play segment, as indicated
25 by
40 step 544. At step 546, the program guide displays a
video feedback area on monitor 45. The program guide
displays the play segments of programs and associated
45 program data on monitor 45 according to the super-
30 program sequence at step 548.

45 The foregoing is merely illustrative of the
principles of this invention and various modifications
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can be made by those skilled in the art without
departing from the scope and spirit of the invention.

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Claims

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What is claimed is:

10 1. A system in which programs and associated program data are displayed for users by an interactive television program guide implemented on — user television equipment, comprising:

15 means for displaying the programs and associated program data on the user television equipment using the interactive television program guide; and

20 means for digitally storing the programs and associated program data in a digital storage device contained in the user television equipment using the interactive television program guide.

25 2. The system defined in claim 1 wherein the display means further comprises means for displaying a set-up screen on the user television equipment using the interactive television program guide.

35 3. The system defined in claim 2 wherein the set-up screen comprises means for providing a user with an opportunity to define one or more storage options.

40 4. The system defined in claim 3 wherein the storage options comprise one or more storage options selected from the group consisting of: languages, video format, enforcement of parental control on storage, and auto-erasing viewed entries.

45 5. The system defined in claim 4 further

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comprising means for digitally storing the programs in a language on a digital storage device with the interactive television program guide using the language storage option.

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6. The system defined in claim 4 further comprising means for digitally storing the programs in a video format on a digital storage device with the interactive television program guide using the video format storage option.

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7. The system defined in claim 4 further comprising means for digitally storing the programs and associated program data on a digital storage device with the interactive television program guide using the enforcement of parental control on storage option.

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8. The system defined in claim 4 further comprising means for automatically deleting programs and associated program data from a digital storage device with the interactive television program guide using the auto-erase viewed entries storage option.

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9. The system defined in claim 2 wherein the set-up screen comprises means for providing a user with an opportunity to define playback options.

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10. The system defined in claim 9 wherein the playback options comprise one or more playback options selected from the group consisting of: default language, default video format, skip commercials.

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11. The system defined in claim 10 wherein the display means displays the digitally stored programs and associated program data in a language on the user television program equipment with the interactive television program guide using the default language playback option.

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12. The system defined in claim 10 wherein the display means displays the digitally stored programs and program data in a video format on the user television equipment with the interactive television program guide using the default video format playback option.

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13. The system defined in claim 10 further comprising:

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means for determining whether the digitally stored programs contain advertising using the interactive television program guide; and wherein the display means skips displaying the advertising information when displaying the digitally stored programs and programming data with the interactive television program guide using the skip commercials playback option.

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14. The system defined in claim 2 wherein the set-up screen comprises means for providing a user with an opportunity to select components for display in screens that display program information.

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15. The system defined in claim 1 wherein the display means further comprises means for

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displaying a recording schedule screen on the user television equipment using the interactive television program guide.

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16. The system defined in claim 15 wherein the recording schedule screen comprises:

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an indication of the programs currently scheduled for storage by the digital storage means; means for providing a user with an opportunity to select one of the programs; and wherein the display means further comprises means for displaying a selected program listing information screen for the selected program on the user television equipment using the interactive television program guide.

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17. The system defined in claim 16 wherein the selected program listing information screen comprises one or more fields of associated program data for the selected program.

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18. The system defined in claim 17 wherein the selected program listing information screen further comprises:

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one or more user fields; and means for providing a user with an opportunity to enter user information into one or more of the user fields.

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19. The system defined in claim 1 wherein the display means further comprises means for displaying a program listings screen on the user

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television equipment using the interactive television program guide, the program listings screen comprising means for providing the user with an opportunity to select a program listing.

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20. The system defined in claim 19 wherein the means for displaying a program listings screen further comprises means for displaying program listings in subsets of listings according to one or more organization criteria.

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21. The system defined in claim 20 further comprising means for providing a user with an opportunity to select the organization criteria.

30

22. The system defined in claim 20 further comprising means for providing a user with an opportunity to define the organization criteria.

35

23. The system defined in claim 19 wherein the means for displaying a program listings screen further comprises means for displaying program listings in sorted lists according to sorting criteria.

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24. The system defined in claim 23 further comprising means for providing the user with an opportunity to select the sorting criteria.

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25. The system defined in claim 19 wherein the program listing screen comprises listings of programs stored by the digital storage means.

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26. The system defined in claim 19 wherein the display means further comprises means for displaying a program listings information screen for the selected program listing on the user television equipment using the interactive television program guide.

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27. The system defined in claim 26 wherein the program listings information screen comprises one or more fields of associated program data selected from the group consisting of: title, description, episode, channel, duration, viewed, cast members, category(ies), language, video format, start and end time, date, re-run indicator, stereo indicator, close-captioned indicator, and other information.

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28. The system defined in claim 25 wherein: the display means further comprises means for displaying one or more on-screen options; and further comprising means for providing a user with an opportunity to select an on-screen option.

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29. The system defined in claim 19 wherein the means for displaying program listings further comprises means for displaying program listings in a program listings grid.

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30. The system defined in claim 29 wherein the program listings grid contains one or more rows of listings of programs stored by the digital storage means.

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31. The system defined in claim 1 wherein the display means further comprises means for displaying the digitally stored programs and associated program data on the user television equipment using the interactive television program guide to provide users with an opportunity to access the associated program data as if the programs and program data were being originally aired.

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32. The system defined in claim 1 wherein the digital storage means further comprises means for digitally storing additional program components on a digital storage device.

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33. The system defined in claim 1 wherein the associated program data comprises program listings data supplied by a main facility.

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34. The system defined in claim 1 wherein the associated program data comprises user added information.

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35. The system defined in claim 1 further comprising means for transferring the digitally stored programs to a secondary storage device using the interactive television program guide.

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36. A system in which programs and associated program data are displayed for users by an interactive television program guide implemented on user television equipment, comprising:

 a digital storage device in the user

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television equipment for digitally storing the programs and associated program data using the interactive television program guide; and

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means for maintaining a directory of the - digitally stored associated program data using the interactive television program guide.

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37. The system define in claim 36 further comprising a means for displaying a directory listing screen on the user television equipment using the interactive television program guide.

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38. The system defined in claim 37 wherein the directory listing screen comprises:

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means for indicating directory entry information; and

means for providing a user with an opportunity to select directory entry information;

35

wherein the display means further comprises means for displaying a full entry information screen in response to the selection by a user of directory information.

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39. The system defined in claim 38 wherein the full entry information screen comprises a plurality of fields of directory entry information selected from the group consisting of: title, description, episode, channel, duration, viewed, cast members, category(ies), language, video format, start and end time, date, re-run indicator, stereo indicator, close-captioned indicator, and other information.

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40. The system defined in claim 39 wherein
the full entry information screen further comprises:
one or more user-defined fields; and
means for providing a user with an —
opportunity to enter user information in one or more of
the user-defined fields.

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41. The system defined in claim 36 further
comprising:

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means for displaying an edit screen; and
means for editing portions of the
digitally stored programs and associated program data
from the digital storage device using the interactive
television program guide.

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42. The system defined in claim 41 wherein
the edit screen comprises means for providing a user
with an opportunity to define the portions of the
digitally stored programs and associated program data
edited by the editing means.

35

43. The system defined in claim 42 wherein
the partial edit screen further comprises a video
feedback area.

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44. The system defined in claim 36 wherein:
the digital storage device digitally
stores the programs and associated program data on
removable digital storage media using the interactive
television program guide; and
the maintaining means maintains the
digitally stored associated program data in a global

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media library using the interactive television program guide.

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45. The system defined in claim 44 further comprising means for displaying a global media library screen on the user television equipment using the interactive television program guide.

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46. The system defined in claim 45 wherein: the global media library screen comprises means for providing a user with an opportunity to select a program stored on the removable storage media; and

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means for displaying an indication that the removable storage medium containing the selected program is not loaded in the digital storage device.

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47. A system in which programs and associated program data are displayed for users by an interactive television program guide implemented on user television equipment, comprising:

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a digital storage device in the user television equipment for digitally storing the programs and associated program data using the interactive television program guide;

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means for defining a super-program sequence; and

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means for displaying the programs and segments of the programs and associated program data according to the defined super-program sequence on the user television equipment using the interactive television program guide.

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48. The system defined in claim 47 wherein
the defining means further comprises means for
displaying a super-program screen on the user
television equipment using the interactive television
program guide.

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49. The system defined in claim 48 wherein
the super-program screen comprises:

an area indicating programs stored on
the digital storage device; and

means for providing a user with an
opportunity to select a program to be included in the
super-program sequence.

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50. The system defined in claim 48 wherein:
the super-program screen further
comprises an area for providing a user with an
opportunity to define play segments; and

the display means further comprises
means for displaying play segments of the programs and
associated program data according to the super-program
sequence on the user television equipment using the
interactive television program guide.

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51. The system defined in claim 50 wherein
the area for providing a user with an opportunity to
define play segments comprises:

a play segment indicator; and

one or more markers for defining the play

segment.

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52. The system defined in claim 48 wherein

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10 the super-program screen further comprises a video feedback area.

15 53. The system defined in claim 47 further comprising means for transferring the digitally stored programs according to the defined super-program to a secondary storage device using the interactive television program guide.

20 54. A method in which programs and associated program data are displayed for users by an interactive television program guide implemented on user television equipment, comprising the steps of:

25 displaying the programs and associated program data on the user television equipment using the interactive television program guide; and

30 digitally storing the programs and associated program data in a digital storage device contained in the user television equipment using the interactive television program guide.

35 55. The method defined in claim 54 further comprising the step of displaying a set-up screen on the user television equipment using the interactive television program guide.

40 45 56. The method defined in claim 55 wherein the step of displaying a set-up screen further comprises the step of providing a user with an opportunity to define one or more storage options.

50 57. The method defined in claim 56 wherein

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the step of displaying a set-up screen further comprising the step of providing a user with an opportunity to define one or more storage options selected from the group consisting of: languages, video format, enforcement of parental control on storage, and auto-erasing viewed entries.

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58. The method defined in claim 57 further comprising the step of digitally storing the programs in a language on a digital storage device with the interactive television program guide using the language storage option.

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59. The method defined in claim 57 further comprising the step of digitally storing the programs in a video format on a digital storage device with the interactive television program guide using the video format storage option.

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60. The method defined in claim 57 further comprising the step of digitally storing the programs and associated program data on a digital storage device with the interactive television program guide using the enforcement of parental control on storage option.

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61. The method defined in claim 57 further comprising the step of automatically deleting programs and associated program data from a digital storage device with the interactive television program guide using the auto-erase viewed entries storage option.

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62. The method defined in claim 55 wherein

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the step of displaying a set-up screen further comprises the step of providing a user with an opportunity to define playback options.

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63. The method defined in claim 55 wherein the step of displaying a set-up screen further comprises the step of providing a user with an opportunity to define one or more playback options selected from the group consisting of: default language, default video format, skip commercials.

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64. The method defined in claim 63 further comprising the step of displaying the digitally stored programs and associated program data in a language on the user television program equipment with the interactive television program guide using the default language playback option.

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65. The method defined in claim 63 further comprising the step of displaying the digitally stored programs and program data in a video format on the user television equipment with the interactive television program guide using the default video format playback option.

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66. The method defined in claim 63 further comprising the steps of:

determining whether the digitally stored programs contain advertising using the interactive television program guide; and

skipping the advertising information when displaying the digitally stored programs and

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programming data with the interactive television program guide using the skip commercials playback option.

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67. The method defined in claim 55 further comprising the step of providing a user with an opportunity to select components for display in screens that display program information.

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68. The method defined in claim 54 further comprising the step of displaying a recording schedule screen on the user television equipment using the interactive television program guide.

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69. The method defined in claim 68 further comprising the steps of:

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indicating the programs currently scheduled for storage by the digital storage means; providing a user with an opportunity to select one of the programs; and

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displaying a selected program listing information screen for the selected program on the user television equipment using the interactive television program guide.

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70. The method defined in claim 69 wherein the step of displaying a selected program listing information screen comprises the step of displaying one or more fields of associated program data for the selected program.

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71. The method defined in claim 70 further

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comprising the steps of:

displaying one or more user fields; and
providing a user with an opportunity to
enter user information into one or more of the user -
fields.

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72. The method defined in claim 54 further
comprising the steps of:

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displaying a program listings screen on the
user television equipment using the interactive
television program guide; and

providing the user with an opportunity to
select a program listing.

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73. The method defined in claim 72 wherein
the means for displaying program listings further
comprises means for displaying program listings in
subsets of listings according to one or more
organization criteria.

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74. The method defined in claim 73 further
comprising the step of providing a user with an
opportunity to select the organization criteria.

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75. The method defined in claim 73 further
comprising the step of providing a user with an
opportunity to define the organization criteria.

45

76. The method defined in claim 72 further
comprising the step of displaying program listings in
sorted lists according to sorting criteria.

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77. The method defined in claim 76 further comprising the step of providing the user with an opportunity to select the sorting criteria.

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78. The method defined in claim 72 wherein the step of displaying a program listings screen further comprises the step of displaying listings of programs stored on a digital storage device.

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79. The method defined in claim 78 further comprising the step of displaying a program listings information screen for the selected program listing on the user television equipment using the interactive television program guide.

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80. The method defined in claim 79 wherein the step of displaying a program listings information screen further comprises the step of displaying one or more fields of associated program data selected from the group consisting of: title, description, episode, channel, duration, viewed, cast members, category(ies), language, video format, start and end time, date, re-run indicator, stereo indicator, close-captioned indicator, and other information.

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81. The method defined in claim 78 further comprising the steps of:

displaying one or more on-screen options; and

providing a user with an opportunity to select an on-screen option.

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82. The method defined in claim 72 wherein the step of displaying program listings further comprises the step of displaying program listings in a program listings grid.

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83. The method defined in claim 72 wherein the step of displaying a program listings grid further comprises the step of displaying one or more rows of listings of programs stored by the digital storage means.

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84. The method defined in claim 54 further comprising the step of displaying the digitally stored programs and associated program data on the user television equipment using the interactive television program guide to provide users with an opportunity to access the associated program data as if the programs and program data were being originally aired.

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85. The method defined in claim 54 further comprising the step of digitally storing additional program components on a digital storage device.

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86. The method defined in claim 54 further comprising the step of providing a user with an opportunity to provide user added information.

87. The method defined in claim 54 further comprising the step of transferring the digitally stored programs to a secondary storage device using the interactive television program guide.

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88. A method in which programs and
10 associated program data are displayed for users by an
interactive television program guide implemented on
user television equipment, comprising the steps of:-
15 digitally storing the programs and associated
program data using the interactive television program
guide; and
20 maintaining a directory of the digitally
stored associated program data using the interactive
television program guide.

25 89. The method define in claim 88 further
comprising the step of displaying a directory listing
screen on the user television equipment using the
interactive television program guide.

30 90. The method defined in claim 89 further
comprising the steps of:
and
35 indicating directory entry information;
providing a user with an opportunity to
select directory entry information;
displaying a full entry information
screen in response to the selection by a user of
directory information.

40 45 91. The method defined in claim 90 further
comprising the step of displaying a plurality of fields
of directory entry information selected from the group
consisting of: title, description, episode, channel,
duration, viewed, cast members, category(ies),
language, video format, start and end time, date, re-

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run indicator, stereo indicator, close-captioned indicator, and other information.

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92. The method defined in claim 91 further comprising the steps of:

displaying one or more user-defined fields; and

providing a user with an opportunity to enter user information in one or more of the user-defined fields.

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93. The method defined in claim 88 further comprising the steps of:

displaying an edit screen; and
editing portions of the digitally stored programs and associated program data from the digital storage device using the interactive television program guide.

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94. The method defined in claim 93 further comprising the step of providing a user with an opportunity to define the portions of the digitally stored programs and associated program data edited by the editing means.

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95. The method defined in claim 94 further comprising the step of providing a video feedback area.

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96. The method defined in claim 88 further comprising the steps of:

digitally storing the programs and associated program data on removable digital storage

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- 64 -

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media using the interactive television program guide; and

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maintaining the digitally stored associated program data in a global media library using the interactive television program guide.

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97. The method defined in claim 96 further comprising the step of displaying a global media library screen on the user television equipment using the interactive television program guide.

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98. The method defined in claim 97 further comprising the steps of:

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providing a user with an opportunity to select a program stored on the removable storage media; and

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displaying an indication that the removable storage medium containing the selected program is not loaded in the digital storage device.

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99. A method in which programs and associated program data are displayed for users by an interactive television program guide implemented on user television equipment, comprising the steps of:

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digitally storing the programs and associated program data using the interactive television program guide;

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defining a super-program sequence; and displaying the programs and segments of the programs and associated program data according to the defined super-program sequence on the user television equipment using the interactive television

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- 65 -

program guide.

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100. The method defined in claim 99 further comprising the step of displaying a super-program — screen on the user television equipment using the interactive television program guide.

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101. The method defined in claim 100 further comprising the steps of:

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indicating programs stored on the digital storage device; and

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providing a user with an opportunity to select a program to be included in the super-program sequence.

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102. The method defined in claim 100 further comprising the steps of:

providing a user with an opportunity to define play segments; and

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displaying play segments of the programs and associated program data according to the super-program sequence on the user television equipment using the interactive television program guide.

40

103. The method defined in claim 102 further comprising the steps of:

displaying a play segment indicator; and providing one or more markers for defining the play segment.

45

104. The method defined in claim 100 further comprising the step of providing a video feedback area.

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105. The method defined in claim 99 further comprising the step of transferring the digitally stored programs according to the defined super-program to a secondary storage device using the interactive television program guide.

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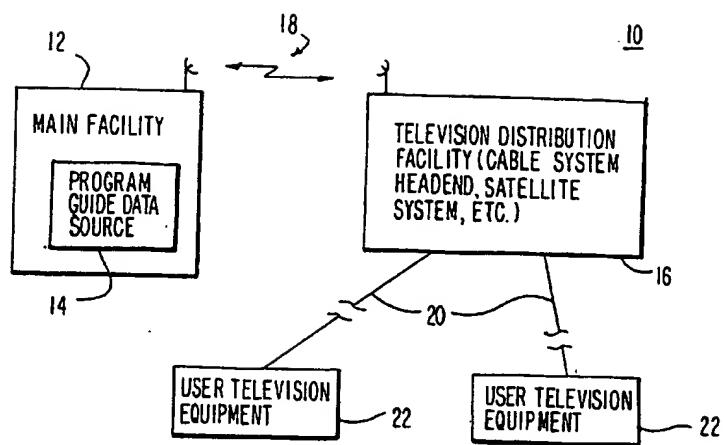


FIG. 1

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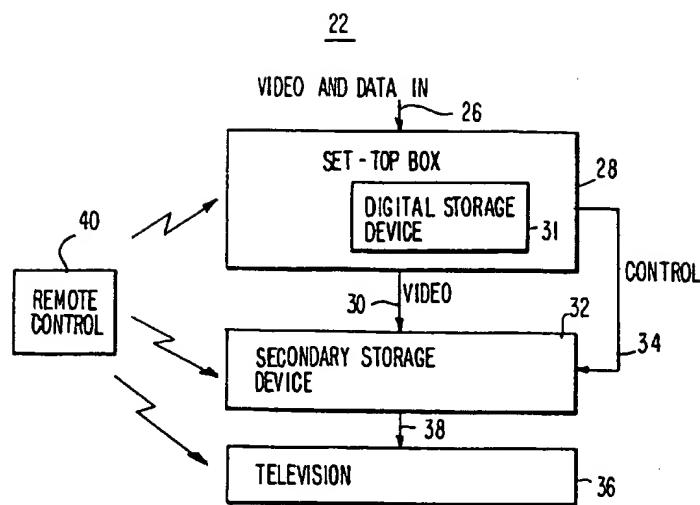
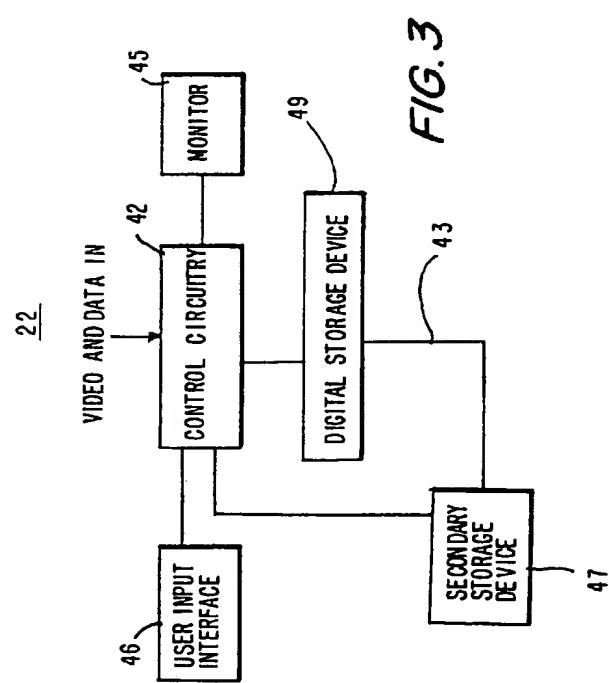


FIG. 2



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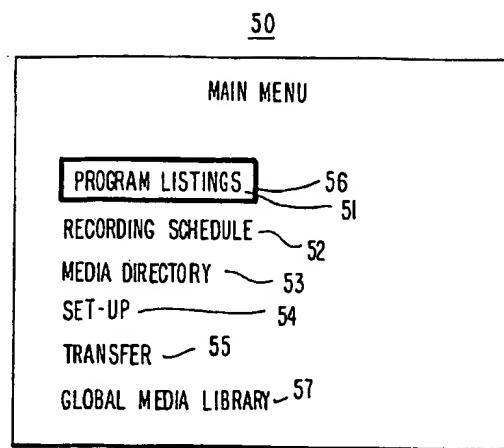


FIG.4

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FIG. 5a

CHANNEL	7:00 PM	7:30PM	8:00PM
2 PUBLIC TELEVISION	PROGRAM 1		PROGRAM 2
3 HBO	PROGRAM 1	PROGRAM 2	61
4 NBC	PROGRAM 1	PROGRAM 2	PROGRAM 3
5 FOX	PROGRAM 1		

63 } 65 } 60 } 65 } 67 }
 62 } 65 } 60 } 65 } 67 }
 64 } 66 } 68 } 69 }

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FIG. 5b

CHANNEL	7:00PM	7:30PM	8:00PM
2 PUBLIC TELEVISION	PROGRAM 1	PROGRAM 2	PROGRAM 3
3 HBO	PROGRAM 1	149	
4 NBC	PROGRAM 1	PROGRAM 2	PROGRAM 3
5 FOX	PROGRAM 1		

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PROGRAM LISTING INFORMATION

TITLE: M*A*S*H

DESCRIPTION: SITUATION COMEDY ABOUT LIFE IN A MASH UNIT DURING THE KOREAN WAR

EPISODE: 1975 EPISODE 5

CHANNEL: 11

DURATION: 30 MIN.

VIEWED: NO

CAST MEMBERS: ALAN ALDA, LORETTA SWIT

CATEGORY(IES): COMEDY, WAR

LANGUAGE(S): ENGLISH

VIDEO FORMAT: NORMAL TV

OTHER INFORMATION: MASH WEB SITE

FIG. 6

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FIG. 7a

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EST. TIME REMAINING: 50 MIN

VOLUME NAME: DISC ONE

TITLE	CHANNEL	RECORD DATE	RECORD TIME	DURATION
M*A*S*H*	11	5/1/98	8:00PM	30 MIN
TERMINATOR	4	5/2/98	8:00PM	120 MIN
WILD-AFRICA	--18--	5/3/98	--7:00PM--	--60 MIN--

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PROGRAM LISTING INFORMATION	
TITLE: M*A*S*H	
DESCRIPTION: SITUATION COMEDY ABOUT LIFE IN A MASH UNIT DURING THE KOREAN WAR	
USER DESCRIPTION: PARTY EPISODE	~85
EPISODE: 1975	EPISODE 5
CHANNEL: 11	
DURATION: 30 MIN.	
VIEWED: NO	
CAST MEMBERS: ALAN ALDA, LORETTA SWIT	
CATEGORY(IES): COMEDY, WAR	~89
USER CATEGORY(IES): DAD'S FAVORITES	~86
LANGUAGE(S): ENGLISH	
VIDEO FORMAT: NORMAL TV	
OTHER INFORMATION: MASH WEB SITE	
USER OTHER: ~88	

FIG. 7b

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CHANNEL	TIME BEGIN	TIME END
5	8:00 PM	10:00PM

FIG. 8

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EST. TIME REMAINING: 500 MIN

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VOLUME NAME: DISC ONE

TITLE	CHANNEL	RECORD DATE	RECORD TIME	91		VIEWED
				DURATION	95	
H.A.S.H*	11	5/1/98	8:00PM	30 MIN	NO	
TERMINATOR	4	5/2/98	8:00PM	120 MIN	YES	
WILD AFRICA	16	5/3/98	7:00PM	60 MIN	YES	
SUPER PROGRAM						

FIG. 9

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FIG. 10

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FULL ENTRY INFORMATION

TITLE: **M*A*S*H**

DESCRIPTION: SITUATION COMEDY ABOUT LIFE IN A MASH UNIT DURING THE KOREAN WAR

USER DESCRIPTION: PARTY EPISODE

EPISODE: 1975 EPISODE 5

CHANNEL: 11

DURATION: 30 MIN.

VIEWED: NO

CAST MEMBERS: ALAN ALDA, LORETTA SWIT

CATEGORY(IES): COMEDY, WAR

 USER CATEGORY(IES): DAD'S FAVORITES

LANGUAGE(S): ENGLISH

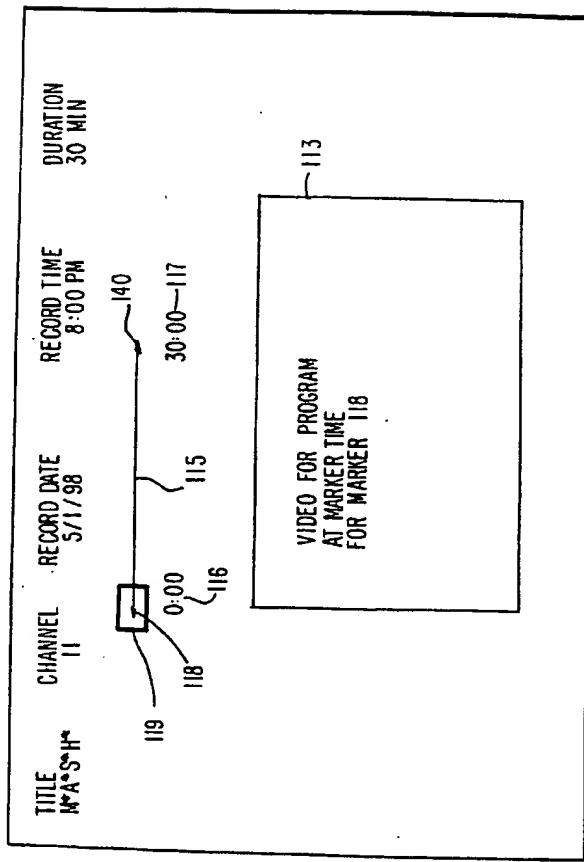
VIDEO FORMAT: NORMAL TV

OTHER INFORMATION: MASH WEB SITE

USER OTHER:

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FIG. 11a

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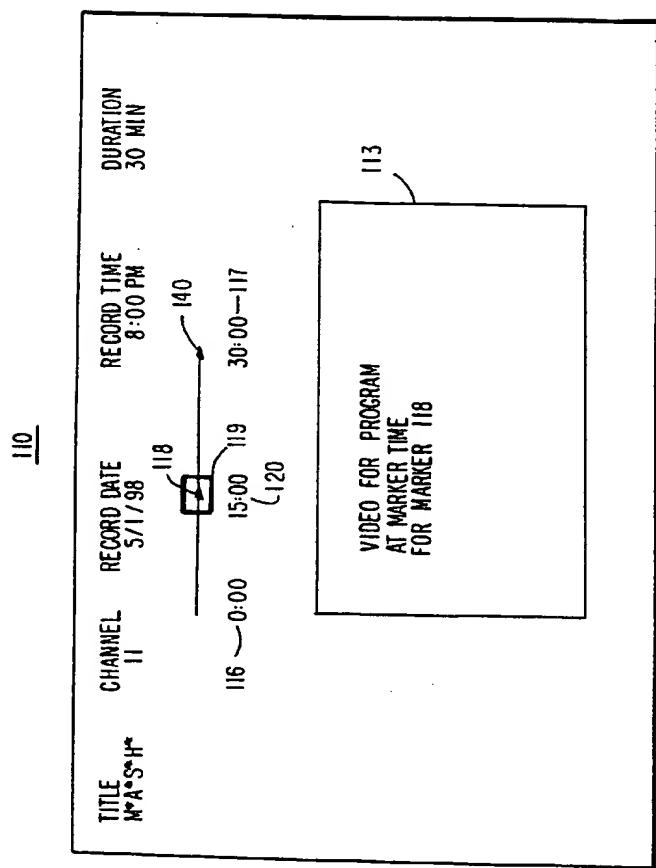


FIG. 1/b

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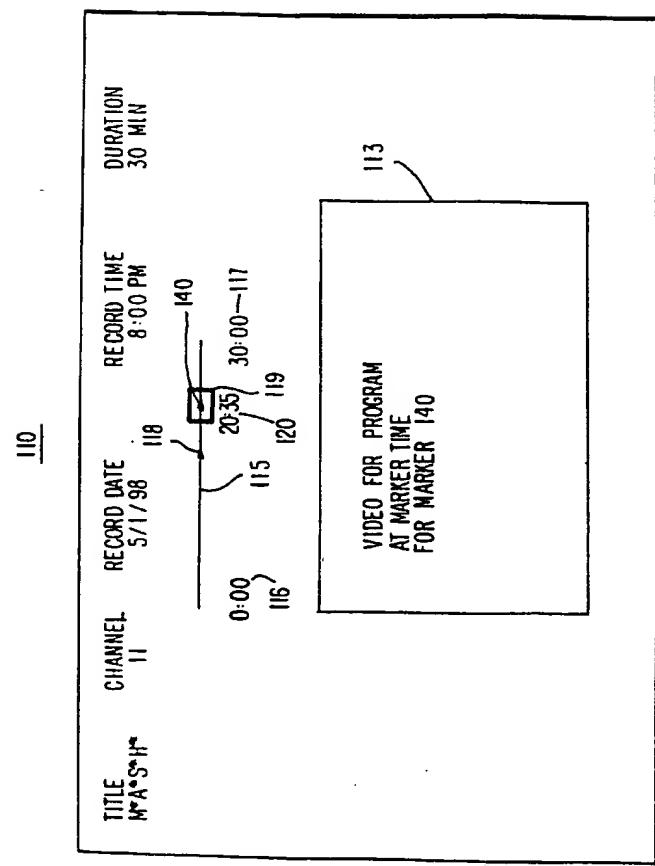


FIG. 1/c

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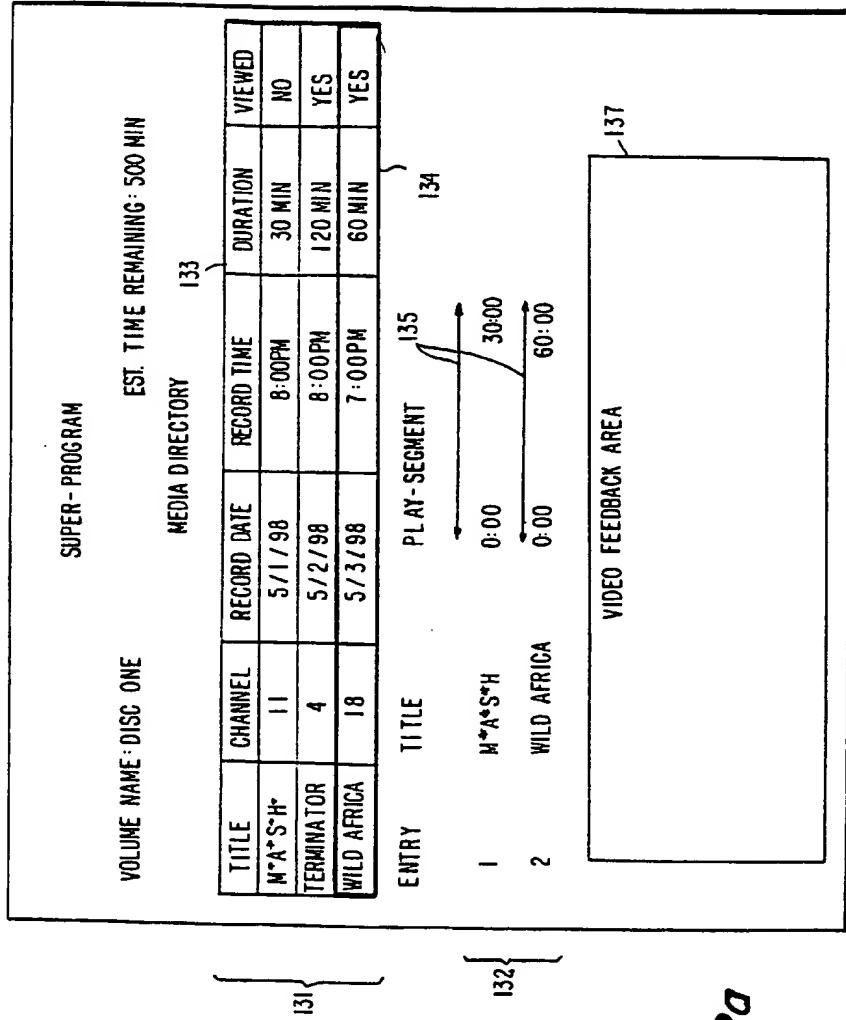
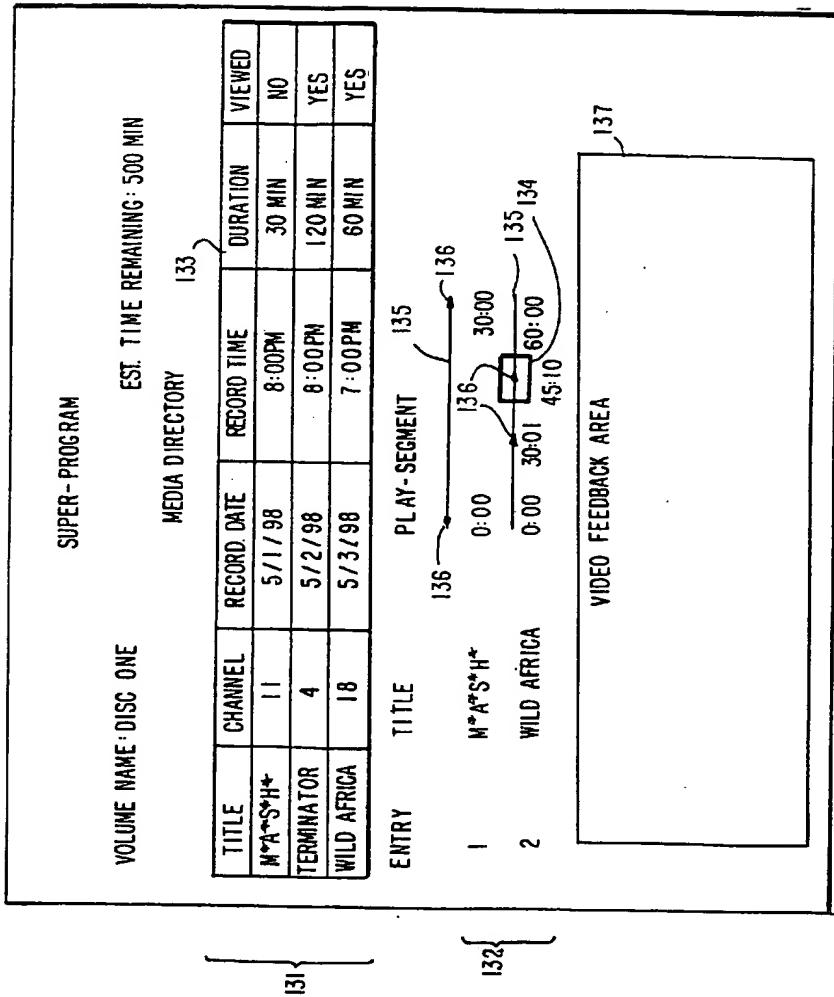


FIG. 12a

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VOLUME	ENTRY	ENTRY	ENTRY
1	PROGRAM 1	PROGRAM 2	PROGRAM 3
2	PROGRAM 1	251	PROGRAM 2
3	PROGRAM 1	PROGRAM 2	PROGRAM 3
4	PROGRAM 1	PROGRAM 2	PROGRAM 3

271 272 250 273

262 263 264 265

251 255

PLEASE LOAD VOLUME 1

FIG. 13

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SET-UP

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ENTRY INFORMATION DISPLAY OPTIONS

TITLE	DESCRIPTION	EPISODE	CHANNEL
RECORD DATE	RECORD TIME	DURATION	CAST MEMBERS
PARENTAL CTRL	CATEGORY(IES)	LANGUAGE(S)	VIDEO FORMAT
OTHER INFO	VIEWED		

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STORAGE OPTIONS

LANGUAGES	ENGLISH
VIDEO FORMAT	HDTV
ENFORCE PARENTAL CONTROL ON STORAGE	YES
AUTO-ERASE VIEWED ENTRIES	YES

AVAILABLE LANGUAGES
ENGLISH
GERMAN
FRENCH
ITALIAN
SPANISH
ALL

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PLAYBACK OPTIONS

DEFAULT LANGUAGE	ENGLISH
DEFAULT VIDEO	HDTV
SKIP COMMERCIALS	YES

FIG. 14

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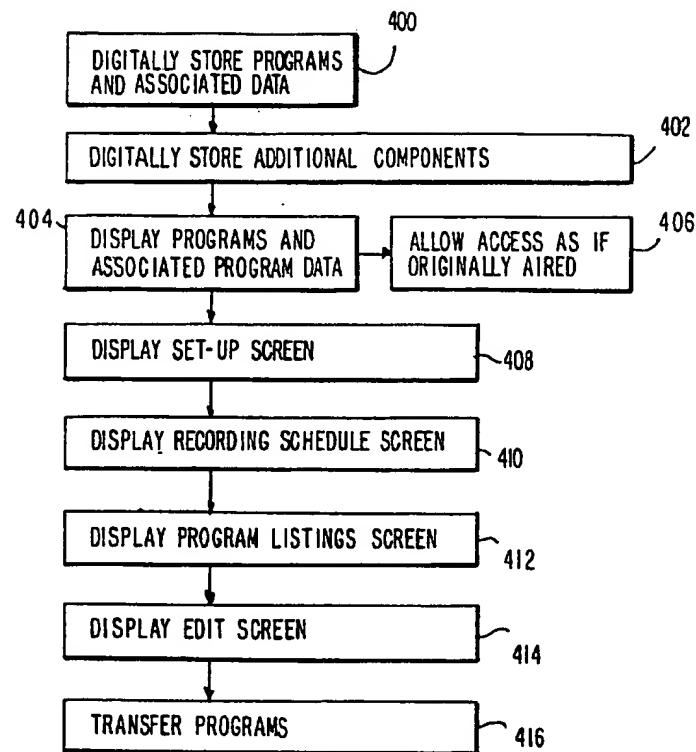


FIG. 15

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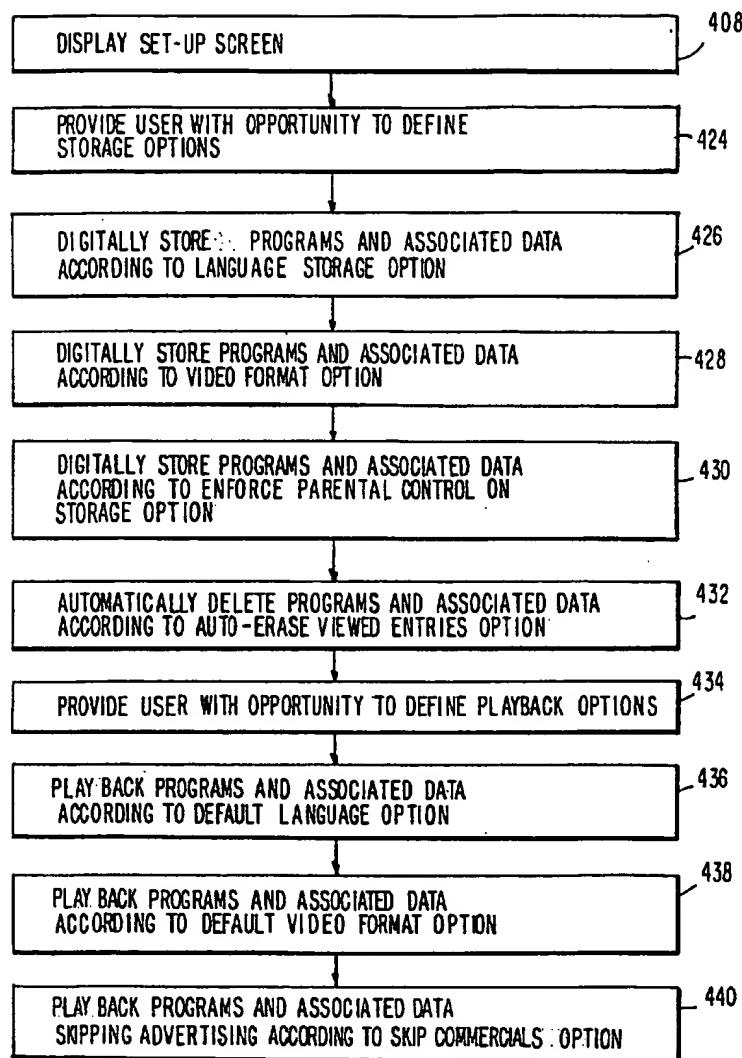


FIG.16

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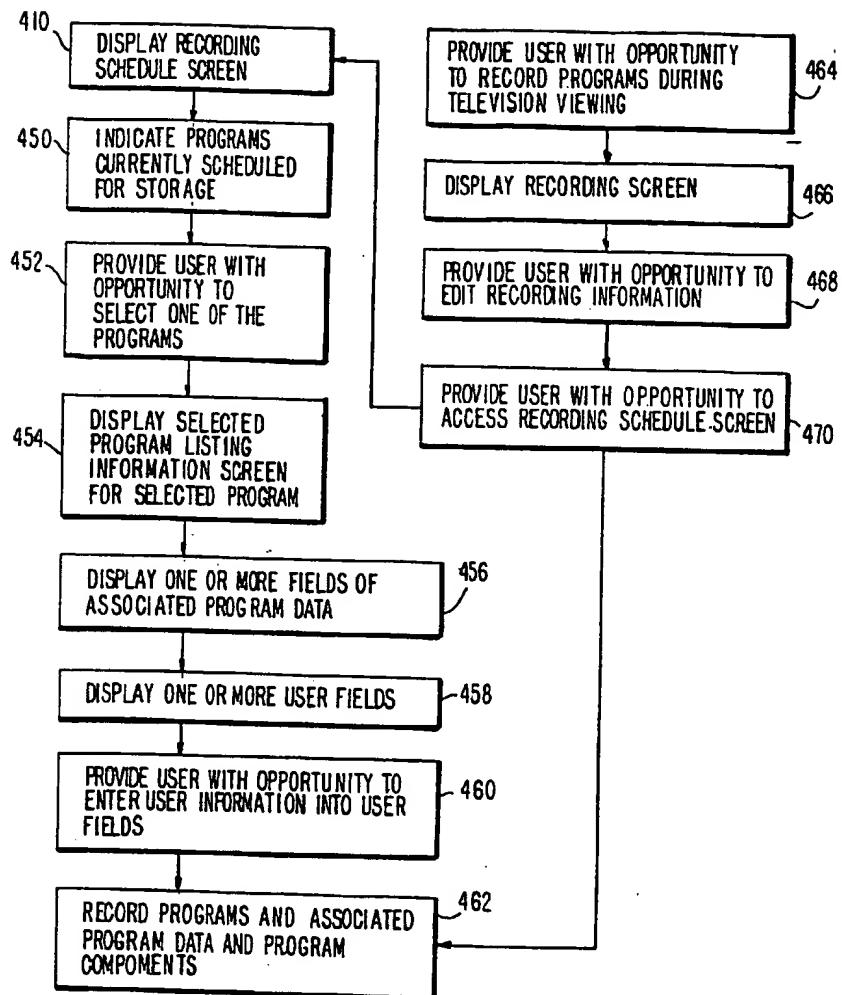


FIG. 17

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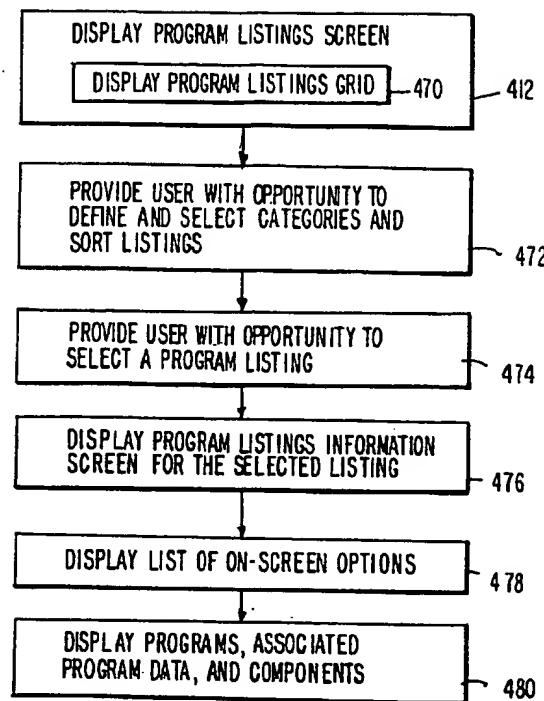


FIG. 18

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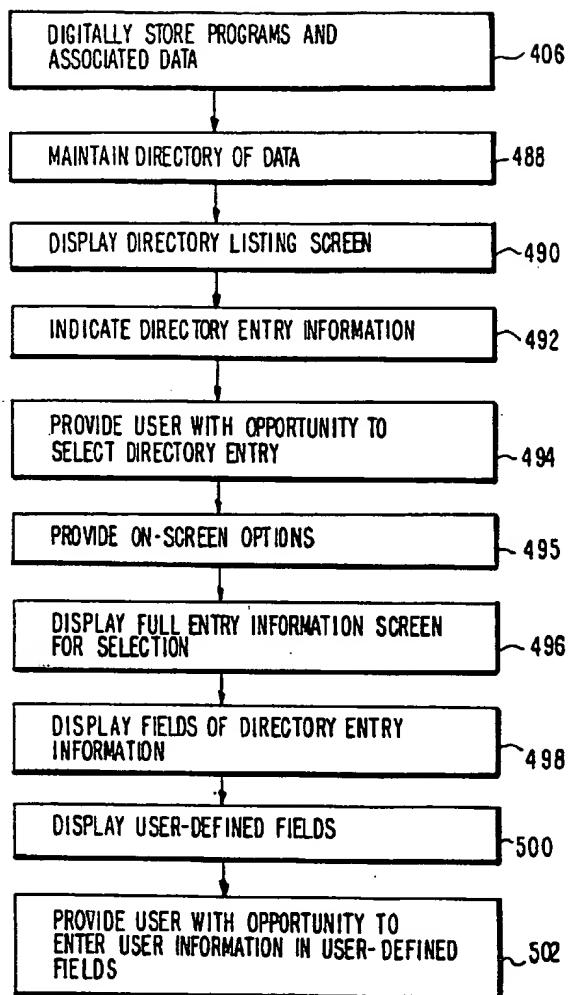


FIG. 19

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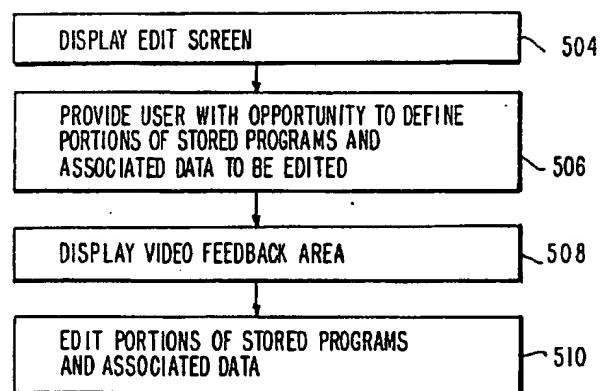


FIG. 20

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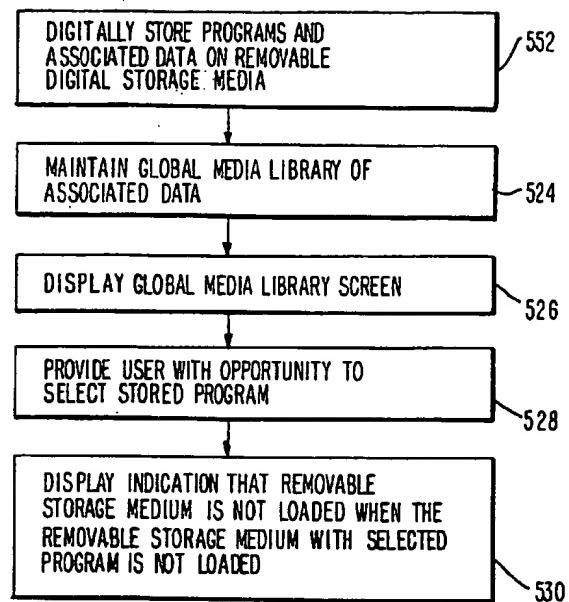


FIG.21

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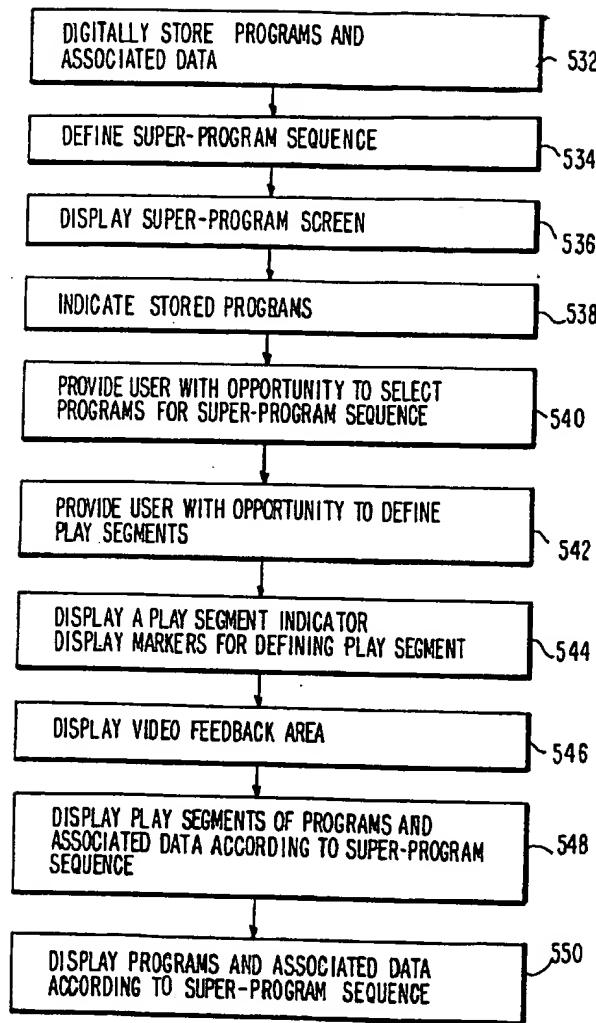


FIG. 22

INTERNATIONAL SEARCH REPORT

Inten. Application No
PCT/US 99/21597

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04N5/445

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 95 32585 A (TV GUIDE ON SCREEN) 30 November 1995 (1995-11-30)	1,36,37, 54,88
A	page 5, line 9 - line 29 page 11, line 2 -page 12, line 10; figures 1,4	44,47,99
Y	WO 95 32587 A (PREVUE INTERNATIONAL INC) 30 November 1995 (1995-11-30)	1,36,37, 54,88
A	page 2, line 5 -page 3, line 2 page 4, line 10 -page 6, line 5; figures 1-4	47,99
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		-/-

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Patent family members are listed in annex.

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Date of the actual completion of the international search

Date of mailing of the International search report

7 January 2000

13/01/2000

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Authorized officer

Fuchs, P

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 99/21597

C(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 223 924 A (STRUBBE HUGO J) 29 June 1993 (1993-06-29) column 1, line 56 -column 2, line 15; figure 3 -----	1-4, 36, 37, 39, 47, 54-57, 72, 78-80, 88, 90, — 91, 99

1

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 99/21597

Patent document

Examination

Patent family

Publication

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